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Solution by G. W. GREENWOOD, M. A., McKendree College, Lebanon, Ill.

Denote the equation of one ellipse by $x^2/a^2 + y^2/b^2 = 1$. The quadrilateral circumscribing both is evidently a rectangle whose sides are respectively parallel to the common chords. Their equations are, therefore,

$$x \cos \frac{1}{2} \theta + y \sin \frac{1}{2} \theta = P_1; \quad -x \sin \frac{1}{2} \theta + y \cos \frac{1}{2} \theta = P_2; \quad \text{where } P_1^2 = a^2 \cos^2 \frac{1}{2} \theta + b^2 \sin^2 \frac{1}{2} \theta; \\ P_2^2 = a^2 \sin^2 \frac{1}{2} \theta + b^2 \cos^2 \frac{1}{2} \theta.$$

The required area $= 4P_1P_2 = 4\sqrt{[(a^2 - b^2) \sin^2 \frac{1}{2} \theta \cos^2 \frac{1}{2} \theta + a^2 b^2]}$.

Also solved by A. H. Holmes, A. S. Hawkesworth, and G. B. M. Zerr.

272. Proposed by R. D. CARMICHAEL, Hartselle, Ala.

A point A revolves with uniform speed in a circle. A point B revolves around A , at a uniform distance from it, with the same angular velocity, but in the opposite direction. Determine the locus of B .

Solution by G. W. GREENWOOD, M. A., McKendree College, Lebanon, Ill.

Denote the center of the fixed circle by O , and take Ox through A and B at a time when these points are collinear, A lying between O and B . Let A move counter clockwise. Then $x = (a + b) \cos \theta$, $y = (a - b) \sin \theta$.

$\therefore \frac{x^2}{(a+b)^2} + \frac{y^2}{(a-b)^2} = 1$, where a, b are the radii of the fixed and moving circles, respectively.

Also solved by A. H. Holmes, A. S. Hawkesworth, D. B. Northrup, G. B. M. Zerr, and Proposer.

GROUP THEORY.

11. Proposed by DR. SAUL EPSTEIN, University of Colorado, Boulder.

Find the six-parameter continuous group which leaves invariant the surface of second order $x_1x_2 - x_3x_4 = 0$.

Solution by the PROPOSER.

To every transformation of this group defined as below, correspond four different sets of values of the parameters $a, b, \dots$. In particular to the identical transformation corresponds $a = d = \pm 1$, $\alpha = \delta = \pm 1$, $b = c = \beta = \gamma = 0$.

The group is

$$\begin{aligned} x'_1 &= a(ax_1 + bx_4) + \beta(ax_3 + bx_2), \\ x'_2 &= \gamma(cx_1 + dx_4) + \delta(cx_3 + dx_2), \\ x'_3 &= \gamma(ax_1 + bx_4) + \delta(ax_3 + bx_2), \\ x'_4 &= a(cx_1 + dx_4) + \beta(cx_3 + dx_2). \end{aligned}$$